

Proposed by: C. Changprai, 1973  
Revised by:  
1. N. Chorphaka, 1988  
2. P. Wiwatwongwana, 2004

**WANG HAI SERIES**

**Field Symbol: Wi**

**Distribution:** Occupies moderate extent in the areas of Central Highlands. especially in Changwat Loei.

**Setting:** Wang Hai soils are derived from residuum and/or colluvium of shale and phyllite in associated with limestone and occur on erosion surface. Relief is undulation with slopes ranging from 2 to 6 percent. Elevation is from 250 to 320 m above sea level. The climate is Tropical Savanna (Koppen 'Aw'). Average annual precipitation is from 1,100 to 1,400 mm. Mean annual air temperature is 27 °C.

**Drainage, Permeability and Runoff:** Moderately well drained. Permeability is moderate to slow surface runoff is rapid to medium. Groundwater table is below 1 m in the wet season, but the subsoil is saturated by seeping water from the higher areas for about 6 months of each year.

**Vegetation and Land Use:** Natural vegetation is Mixed Deciduous forest. Parts are cleared for upland crop cultivation such as corn, sorghum, castor bean, peanut, watermelon, cotton and cassava.

**Characteristic Profile Features:** Wang Hai series is a member of the fine, mixed, active, isohyperthermic Oxyaquic (Ultic) Paleustalfs. They are deep soils and are characterized by a dark brown or dark reddish brown clay loam or silty clay loam A horizon overlying a (dark) reddish brown or brown grading to yellowish red or red clay or clay loam argillic B horizon. Mottles occur in the subsoil, usually at a depth around 50 cm of the surface of lower. Colors of mottles are light yellowish brown, pale brown and brownish yellow or yellowish brown. Reaction is medium acid to neutral at the surface layer and very strongly acid to strongly acid in the subsoil.

**Typifying Pedon:** Profile code no. is NE-N-26/35 (moist colors unless otherwise stated).

**Location:** Near Ban Wang Hai, Amphoe Wang Saphung Changwat Loei.

**Sheet Name:** Amphoe Wang Saphung

**Sheet No.:** 5343 I

**Coordinate:** -

**Elevation:** -

**Relief:** gently undulating

**Slope:** 2-6 %

**Physiography:** erosion surfaces

**Parent material:** residuum and/or colluvium derived from shale and phyllite association with limestone

**Drainage:** moderately well drained

**Permeability:** moderate to slow

**Runoff:** rapid to medium

**Ground water depth:** >1 m

**Flooding depth:** -

**Duration:** -

**Frequency:** -

**Annual rainfall:** 1,238.1 mm

**Mean temp.:** 25.5 °C

**Climate type:** Tropical Savannah (Aw)

**Natural vegetation or land use:** upland crops; corn, cassava, peanut

**Described by:** Chaleao Changprai

**Date:** 19 July, 1973

**Revised by:** Phusit Wiwatwongwana

**Date:** 28 May, 2004

Horizon	Depth (cm)	Description
Ap	0-17	Dark brown (7.5YR3/2) silt loam; weak coarse subangular blocky structure; firm, sticky, plastic; common fine roots; moderately acid (field pH 6.0); clear, smooth boundary.
Bt1	17-35	Dark reddish brown (5YR3/4) silt loam; moderate medium and coarse subangular blocky structure; slightly firm, sticky, plastic; patchy thin clay coatings on ped faces; common fine roots; strongly acid (field pH 5.5); gradual, smooth boundary.
Bt2	35-55	Red (2.5YR5/6) clay loam; many fine distinct yellowish brown mottles; moderate medium and coarse subangular blocky breaking to strong fine

		angular blocky structure; friable, sticky, plastic; broken moderately thick clay coatings on ped faces and continuous in pores; common fine and few medium roots; very strongly acid (field pH 5.0); gradual, smooth boundary.
Bt3	55-90	Red (2.5YR4/8) clay; many medium distinct yellowish brown mottles; moderate medium and coarse subangular blocky breaking to strong fine angular blocky structure; friable, sticky, plastic; continuous moderately thick clay coatings on ped faces; few fine roots; very strongly acid (field pH 4.5); gradual, smooth boundary.
BC	90-120+	Red (10R-2.5YR4/8) clay; many medium distinct yellowish brown mottles; contain about 5 percent angular and subangular shale and phyllite fragments; very strongly acid (field pH 4.5).

**Type Location:**

Wang Hai series was named for Tambon Wang Hai in which soils of this series were first described at a pit about 4 km south of Ban Pha Noi, on left side of feeder road to Udon - Wang Saphung road.

**Range of Profile Features:**

The A horizon is from 15 to 30 cm thick and has 7.5YR or 5YR or 10YR hues, values and chromas of 2 to 4. Textures of loam or silt loam may occur. Structure is weak medium to coarse blocky and granular. Field pH values range from 6.0 to 7.0.

The B horizon has 5YR or 2.5YR hues values of 3 to 5 and chromas of 4 to 8. Structure is moderate medium to coarse blocky. Field pH values range from 4.5 to 5.5. It may contain coarse fraction which consists of shale, phyllite fragment at some depth below 80 cm of the surface.

**Similar Soil Series:**

Loei series (Lo): is well drained soils and derived from granite.

Pak Chong series (Pc): is well drained soils, very fine family, and low base saturation.

Ban Chong series (Bg): is well drained soils, they are very deep soils, and low base saturation.

**Principal Associated Soils:**

These include Wang Saphung, Ban Chong, Loei, Pak Chong and Tha Khli series.

**Remark:**

These soils were mapped as Loei, mottled subsoil variant in Udon provincial Survey.

**ANALYSIS RESULTS**  
(oven dry basis)

Profile code no.: NE-N-26/35  
Soil series: Wang Hai (Wi)

Lab No.	Depth (cm)	Horizon	Particle size distribution analysis (% by weight)							Texture		pH		CaCO <sub>3</sub> %	P, mg kg <sup>-1</sup> Bray 2	K, mg kg <sup>-1</sup> NH <sub>4</sub> OAc	
			USDA grading			Sand-fraction grading				Lab	Field	1:1	1:1				
			sand	silt	clay	vc	c	m	f	vf	result	estim <sup>n</sup>	water				KCl
Pd-1620	0-17	Ap	29.5	53.0	17.5						sil	sil	5.1	4.2	1.5	7.0	146
Pd-1621	17-35	Bt1	25.0	50.5	24.5						sil	sil	5.0	3.9	1.2	4.0	99
Pd-1622	35-55	Bt2	21.5	45.5	33.0						cl	cl	5.0	4.0	1.8	3.6	102
Pd-1623	55-90	Bt3	16.0	34.0	50.0						c	c	5.0	4.1	1.2	6.1	129
Pd-1624	90-120+	BC	21.0	32.0	47.0						c	c	5.1	4.2	1.8	6.9	140

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol <sub>(c)</sub> kg <sup>-1</sup> )										Base satur <sup>n</sup> (%)		ECEC cmol <sub>(c)</sub> kg <sup>-1</sup> (B+D)	Al KCl extr. cmol <sub>(c)</sub> kg <sup>-1</sup> (D)	Electrical conduct <sup>y</sup> (ECx10 <sup>6</sup> ) dS m <sup>-1</sup>
				Ca	Mg	K	Na	SUM	Extr.	SUM	CEC	CEC	B/Cx100	(Bx100)/				
								cations (B)	acidity (A)	(B+A)	NH <sub>4</sub> OAc (C)	100g Clay	(B+A)					
0-17	2.2	2.41		5.90	3.30	0.40	0.10	9.70	12.40	22.10	14.5	82.9	67	44			0.30	
17-35	2.4	1.61		3.70	2.40	0.20	0.20	6.50	16.60	23.10	15.5	63.3	42	28			0.15	
35-55	3.4	1.32		4.40	2.90	0.20	0.20	7.70	17.30	25.00	17.9	54.2	43	31			0.15	
55-90	4.9	1.03		7.70	4.30	0.30	0.20	12.50	20.90	33.40	25.6	51.2	49	37			0.16	
90-120+	3.2	0.91		11.00	5.00	0.30	0.30	16.60	17.50	34.10	26.8	57.0	62	49			0.17	

Surveyor: Chaleao Changprai

Date: 19 July, 1973